PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(oracle01.028)

Applicant:	Ying Hu et al.	**Confirmation No.:** 9081	
Application No:	10/810,756	**Group Art Unit:** 2166	
Filed:	3/26/04	**Examiner:** Ahluwalia, Navneet K.	

Title: *A database management system with persistent, user-accessible bit map values*

Commissioner for Patents
Alexandria, VA 22313-1450

Brief for a pre-appeal brief conference

Status of the prosecution

Examiner mailed a final Office action in the above patent application on 9/19/2007 in which she rejected all claims under 35 U.S.C. 103(a) as obvious over the combination of USSN 6,067,540, Ozbutun, et al., *Bitmap segmentation*, issued May 23, 2000 (hereinafter "Ozbutun") and U.S. Patent 6,026,398, Brown, et al., *System and method for searching and matching databases*, issued Feb. 15, 2000 (henceforth "Brown"). Applicants traversed the rejection in a response mailed 12/18/2007 and Examiner responded in an Advisory Action mailed 1/16/2008 in which she persisted in her rejection. Applicants are now responding with a Request for a Pre-Appeal Brief Conference and the following *Brief*. In the *Brief*, locations in Applicants' Specification are cited using the paragraph numbers from the published application, which bears the publication number US 2005/0216518

What Applicants are claiming

As set forth in Applicants' *Abstract*, Applicants' inventions concern techniques for making bitmap values in database systems more useful than they presently are. Bitmap values have long been used in the bitmap indexes which database systems provide to

users, but users of database systems which employed bitmap indexes could do no more than specify that the database system make a bitmap index for a field of a table or drop such an index. All of the operations necessary to create, maintain, use, and delete the bitmap indexes were automatically .performed by the database system. See [0017]-[0020] of US 2005/0216518. In Applicants' inventions, by contrast, the user can directly define and manipulate bit-map values that represent sets of objects whose definitions are built into the database system. An example of such objects is row identifiers. Claim 1 sets forth one aspect of the invention:

> **1.** (currently amended) A database management system having the improvement comprising:
> bitmap values, a bitmap value having a representation of a bitstring wherein set bits specify a set of objects whose definitions are built into the database management system, and
> bitmap operations provided by the database system, a bitmap operation having user-specified operands which are bitmap values and/or sets of objects.

The limitations of lines 6-8 of claim 1 clearly distinguish the claim from the prior art of [0017]-[0020]. As will be shown in the following, they also clearly distinguish the claim from the disclosures of Ozbutun and Brown.

The disclosures of Ozbutun and Brown

Ozbutun

The Ozbutun reference is primarily concerned with dividing bitmap indexes into segments in order to reduce the size of the indexes and to reduce the granularity of operations such as compression, de-compression, locking, and logging which the relational database system automatically performs in the course of using and maintaining bitmap indexes (Ozbutun, *Abstract*). There is simply no disclosure anywhere in Ozbutun which indicates that users have access to primitive operations on the bit map indexes. In her rejection of claim 1, Examiner cites FIG. 3A, col. 5, lines 58-67, col. 6, lines 20-26, and col. 7, lines 4-21 as showing the claimed "bitmap operation having user specified operands". FIG. 3A shows a table and FIG. 3B shows a segmented version of a standard prior-art bitmap index. Col. 5, lines 58-67 describes the figures; col. 6, lines 20-27

describes how if all of the indexed fields in a segment of a segmented bitmap have the same value, the segment will merely specify the range and the value. There is no indication in Ozbutun that a user can specify that a bitmap index be segmented or that the user can specify how it will be segmented.

Col. 7, lines 4-21 sets forth how segmenting a bitmap index speeds up operations involving the bitmap index. The described operations are, however, all operations that the relational database system automatically performs on the bitmaps in the course of using the bitmaps in query operations; none of them is "a bitmap operation having user specified operands", as required by the claim.

In her *Advisory Action*, Examiner rebuts the foregoing by stating that col. 6, lines 40-56 teaches that the user may specify segmentation of bitmaps. The cited location, however, merely sets forth that "Database systems may avoid many of the problems associated with the maintenance and use of bitmaps by segmenting bitmaps in the manner described above" and then explains how segmenting bitmaps improves locking granularity. Nothing in the cited location suggests that the *user* may specify segmentation of bitmaps.

Brown

The first sentence of Brown's *Abstract* gives a good overview of the reference's disclosure:

> In a database data processing system, input search data is matched against an index of a database to determine database records which either closely or exactly match the input search data.

As one would expect from the above, Brown is only marginally concerned with bitmap indexes. They appear in Brown's disclosure only as one of the many kinds of indexes which may be used in Brown's system. The total disclosure concerning bitmaps in Brown consists of the following: col. 2, lines 20-34, which describe the use of bitmaps in inverted indexes, and col. 5, lines 1-8 and col. 11, lines 22-37 together with FIG. 15, which describe how bitmaps may be used to identify the database records to which a term set relates.

Examiner cites none of the disclosure concerning bitmap indexes in Brown. Instead, she cites to col. 14, lines 36-58, which must be understood in the context of the "flowchart of match engine processing shown in FIG. 7" (col. 9, lines 38-39). In overview, what the flowchart of FIG. 7 shows is how input data which is to be matched with records in a database is received (30), parsed into its elements (31), and is converted to terms belonging to a predetermined set of terms used in the database system (33). The terms resulting from the conversion are matched to records in the database system, with indexes being used in the matching (35). The indexes may of course be bitmap indexes. Once the records matching the terms have been returned, the records are filtered as shown in steps 36-40 to determine which records best match the criteria specified in the input data. The filtering is described beginning at col. 12, line 21. There are three stages to the filtering: by record weight (36), by applying a function to the results of the filtering by record weight (37), and if that function does not produce a match (38), applying a third function (40).

Col. 14, lines 36-58 cited by Examiner are part of the discussion of step 37. FIG. 11 is a list of the tests applied to the weights of the records received from the first stage of the filter. The meanings of the symbols used in the list are explained in the box labeled "Legend". As can be seen there, the tests involve record weights C from the first stage of the filter, record weights W from the second stage of the filter, constants K, and the mathematical mean, sum, min, abs, and sqrt operations. *None* of these functions have "user-specified operands" (the operands are the records which are the results of the first stage of the filtering), and even more to the point, *none* of these functions involve bitmaps either as operands or as results. Consequently, *none* of these functions can be taken to be the "bitmap operation" of the claim.

Independent claims 22, 36, and 44

These claims all include limitations involving bitmap operations which may be performed by users of the database system. As pointed out above with regard to claim 1,

the references do not disclose such operations, and consequently, the references cannot be combined to reject claims 22, 36, and 44 under 35 U.S.C. 103.

Patentability of the claims over the references

As just demonstrated, neither Ozbutun nor Brown discloses claim 1's limitation

> bitmap operations provided by the database system, a bitmap operation having user-specified operands which are bitmap values and/or sets of objects

or the analogous limitations of claims 22, 36, and 44.

Because that is the case, Examiner has not made the *prima facie* case of obviousness required by MPEP 2142 and her rejection of claims 1, 22, 36, and 44 under 35 U.S.C. 103(a) is without basis. Further, because all of the independent claims are patentable over the references, so are all of the dependent claims. Applicants consequently respectfully request that the Conferees reverse Examiner's rejection of the claims and return the application to Examiner with instructions to allow the claims and pass the application to issue.

Respectfully submitted,

/Gordon E. Nelson/
Attorney of record,
Gordon E. Nelson
57 Central St., P.O. Box 782
Rowley, MA, 01969,
Registration number 30,093
Voice: (978) 948-7632
Fax: (866) 723-0359
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